AF 1723

Corres. and Mail
BOX AF

PATENT
U.S. SERIAL NO.: 09/066,168
DOCKET NO.: 10089/4

#22 7.3.01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS	:	KATSUBE et al.
SERIAL NO.	:	09/066,168
FILED	:	April 24, 1998
FOR	:	PERMSELECTIVE MEMBRANE MODULE
GROUP ART UNIT	:	1723
EXAMINER	:	A. Fortuna

ASSISTANT COMMISSIONER FOR PATENTS
Washington D.C. 20231

APPEAL BRIEF

SIR:

This is an Appeal from an Office Action dated December 4, 2000, finally rejecting each of the pending claims, 1 to 2. The Notice of Appeal was filed on February 27, 2001. The period to file this Appeal Brief expires on June 27, 2001, with a two month extension of time by payment of the request fee of $390.00 for a Petition of Extension of Time under 37 C.F.R. 1.136(a).

1. REAL PARTY IN INTEREST

The real party in interest in this matter is Toyo Boseki Kabushiki Kaisha.

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

3. STATUS OF THE CLAIMS

Claims 1-2 are pending in this application. (See the Appendix).

Claims 1-2 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,293,419 to Sekino et al. or Sekino et al. in view of European Patent Appln. 0,053,635 to Tetsuo et al.

This appeal is an appeal from the rejection of all the claims.

4. STATUS OF AMENDMENTS

All amendments to date have been entered.

5. SUMMARY OF THE INVENTION

The present invention provides a permselective module that reduces pressure loss of feed liquid thereby improving separation performance. Specification at 5-6. The disclosed low cost permselective module allows for monitoring of the separation performance by which one can control the quality of produced water. Id. at 6. The disclosed permselective module is primarily used for desalination. Id. at 1.

One embodiment of the present permselective module includes two permselective membrane elements formed of hollow fibers. Id. at 5. The two elements are arranged substantially in parallel and bundled together within a container. Id.

In addition to the two permselective membrane elements, the container also contains a feed tube. Id. The feed tube lies longitudinally within the container having one end open and one end closed. Id. The feed tube is surrounded by the hollow fibers and has a number of holes along its length through which liquid flows. The feed tube is broken into two sections (each section corresponding to a permselective membrane element), the sections being connected by a connecting tube. Id.

The container has an inner wall surrounding the permselective membrane elements and a feed port in one end corresponding to the open end of the feed tube. Id. In the container between the inner wall and the permselective membrane elements there is space in which the non-permeated fluid moves. To discharge the non-permeated fluid, a discharge outlet is used. Id. The centerline of the discharge outlet is substantially proximal to one end of the container and any space downstream of the discharge outlet is sufficiently small to allow purging of suspended materials, thereby minimizing pressure loss in the permselective membrane module. Id. at 5-6 and Figure 1 of the Application. There is also a permeate liquid outlet at the opposite end from the feed port. Figure 1.

In another embodiment of the present invention, the above described permselective membrane module has a inner liquid receiving plate located between the two permselective membrane elements. Specification at 7. The inner liquid receiving plate collects non-permeated liquid, which is then discharged through the non-permeated liquid discharge outlet. Id.

6. ISSUE

Whether claims 1-2 patentably distinguish over Sekino et al. under 35 U.S.C. §103(a).

Whether claims 1-2 patentably distinguish over Sekino et al. in view of Tetsuo et al. under 35 U.S.C. §103(a).

7. GROUPING OF CLAIMS

The claims may be grouped as follows.

A. Claims 1 is directed to a permselective membrane module including two permselective membrane elements.

B. Claim 2 is directed to a permselective membrane module including two permselective membrane elements and an inner liquid receiving plate located between the two elements.

The respective groups of claims stand or fall together for purposes of this appeal.

8. ARGUMENT

The Examiner rejected independent claims 1 and 2 under 35 U.S.C. § 103(a) as unpatentable over Sekino et al. individually or in view of Tetsuo et al. According to MPEP § 2143 to establish a prima facie case of obviousness an Examiner must meet three basic criteria 1) there must be some suggestion or motivation to combine the cited references, either in the references or generally available to one of ordinary skill in the art; 2) there must be a reasonable expectation of success; and 3) the prior art references must teach all of the claim limitations.

Appellants respectfully submit that the Examiner has not met her initial burden in this case.

A. SEKINO ET AL. DOES NOT TEACH ALL OF THE CLAIM LIMITATIONS

Sekino et al. teaches a hollow fiber membrane module in which the feed port and the non-permeated liquid discharge outlet are located perpendicular to the permselective elements, in the center of the module. See Figures 1, 3, 4, 5, and 6. As shown in Sekino et al. each set of elements 5 & 8 and 7 & 9 can be either the feed port or the non-permeated liquid discharge outlet. See column 3, lines 53 to 55.

The Examiner acknowledges that Sekino et al. does not teach the location of the claimed non-permeated liquid discharge outlet. However, the Examiner indicates that locating the outlet at the end of the module is "conventional in the art." See page 2 of the Final Office Action dated December 4, 2000. Based on this, the Examiner further indicates that modifying Sekino et al. to move the location of the outlet would have been obvious to one of ordinary skill in the art.

In contrast, Appellants' claimed invention has the non-permeated discharge outlet perpendicular to the two permselective membrane elements and the centerline of the non-permeated discharge outlet "substantially proximal" to one end of the cylindrical pressure vessel containing the permselective membrane elements. See claims 1 and 2 and Figures 1-3.

In addition, Appellants have identified a source of a know problem in the art–pressure loss within permselective modules. Appellants have found that by locating the non-permeated liquid discharge outlet as described, one can minimize the pressure loss in the permselective membrane module. See claims 1 and 2. Also, by locating the non-permeated liquid discharge

outlet towards one end of the cylindrical pressure vessel, the space downstream from the outlet is "sufficiently small" to allow purging of suspended materials. See claims 1 and 2.

In view of the differences between Sekino et al. and the claimed invention, Appellants respectfully submit that the claimed invention is not obvious in view of Sekino et al. As noted by the Examiner, Sekino et al. does not teach the claimed location of the non-permeated liquid discharge outlet. Nor does Sekino et al. recognize that locating the non-permeated liquid discharge outlet near one end of the module but perpendicular to that end, allows one to minimize the pressure loss across the permselective module by purging suspended materials.

As to whether the claimed location is conventional in the art, Appellants disagree with the Examiner. There is no reference that shows a non-permeated liquid discharge outlet on the side of a module nor that indicates that by locating the discharge outlet as claimed, pressure loss is minimized.[1] Nor does Sekino et al. itself suggest relocating the outlet to the claimed position for any reason.

Therefore, Appellants submit that one of ordinary skill in the art would not have been motivated to modify Sekino et al. to achieve the claimed permselective module with the non-permeated liquid discharge outlet located on the side substantially proximal to one end of the

---

[1]The Examiner cites three references as showing conventional housings and discharge outlet locations. The three references include U.S. Pat. Nos. 5,139,669, 5,814,179, and 5,380,433. However, upon careful review of these references, not one indicates that the permeated liquid is discharged through the "side" outlets. In '669, the invention is directed to blood dialysis and the port **43** shown is used to pass blood back and forth, not to separately discharge non-permeated fluid. See columns 5, line 59 to column 6, line 24. Patent No. '179 is also directed to blood dialysis, but more specifically to a way to clean a blood dialysis module. In '179, again there is no disclosure of using the side port **6b** for non-permeated fluid and another port for permeated fluid. In fact, '179 discloses flushing the module with a cleaning solution, all of which is emptied through port **6b.** When the module is actually used, blood is discharged through port **6b**--a permeated fluid. See columns 4 to 5. Finally, in '433 the non-permeated liquid is clearly discharged through port **32**, which is on one end of the module. The port **40** on the side of the module is optionally used for permeate liquid, not for non-permeated liquid. See column 6, lines 1 to 43.

module.

B. THERE IS NO MOTIVATION TO COMBINE SEKINO ET AL. AND TETSUO ET AL.

Appellants respectfully submit that one of ordinary skill in the art would not be motivated to combine Sekino et al. and Tetsuo et al. to achieve Appellants' claimed invention.

The Examiner recognized that Sekino et al. fails to disclose the location of the non-permeated liquid discharge outlet as claimed. However, the Examiner cited Tetsuo et al. in combination with Sekino et al. as teaching one of ordinary skill in the art how to achieve Appellants' claimed invention. However, one of ordinary skill in the art would not have been motivated to combine the teachings of the two references to achieve Appellants' claimed invention because Tetsuo et al. discloses a different hollow fiber arrangement than Sekino et al.

Tetsuo et al. teaches a module including hollow fibers aligned in a crisscross pattern. See Figure 6. Tetsuo et al. also teaches that the previously known "membrane separation apparatuses . . . [including] a number of hollow fibers arranged in layers around a supporting core" have a number of "defects." See page 1 to 2. These defects include forming a dead space in the module resulting in a slower permeation flow rate and a decrease in separation efficiency, and large pressure loss, among others. See page 2 to 4.

Applicants submit that Tetsuo et al.'s disclosure clearly teaches away from the invention disclosed in Sekino et al. For example, the arrangement of the hollow fibers disclosed by Tetsuo et al. is different than Sekino et al. and Tetsuo et al. clearly indicates that the hollow fiber arrangement disclosed by Sekino et al. has many problems.

In view of the teachings of Tetsuo et al., Appellants submit that one of ordinary skill in the art would not have been motivated to modify Sekino et al. with the teaching of Tetsuo et al. to achieve Appellants claimed invention, including the centerline of the non-permeated liquid discharge outlet being located located substantially proximal to one end of the cylindrical pressure vessel whereby any space downstream of said outlet is sufficiently small to allow purging of suspended materials, thereby minimizing pressure loss in the permselective membrane module.

C. IF COMBINED, SEKINO ET AL. AND TETSUO ET AL. STILL DO NOT TEACH OR SUGGEST EVERY ELEMENT OF APPELLANTS' CLAIMED INVENTION

Appellants submit that even if Sekino et al. and Tetsuo et al. are combined, they do not teach each and every element of Appellants claimed invention.

Tetsuo et al. discloses the non-permeated liquid discharge outlet as being on one end of the module. See element **15** of Figure 2. Even if Sekino et al. was modified to have the discharge outlet of Tetsuo et al. the resulting module would not meet Appellants' claim language. Appellants' claimed module has the centerline of the discharge outlet substantially proximal to one end of the cylindrical pressure vessel. Neither Sekino et al. nor Tetsuo et al. show or disclose the discharge outlet being located as claimed. Therefore, Appellants submit that even if combined, the resulting module would not be Appellants' claimed module including the centerline of the permeated liquid discharge outlet being substantially proximal to one end of the cylindrical pressure vessel whereby any space downstream of said outlet is sufficiently small to allow purging of suspended materials, thereby minimizing pressure loss in the permselective

membrane module.

SUMMARY

In view of the above, Appellants submit that all claims on appeal distinguish over the art and respectfully request that the Examiner's rejections of these claims should be reversed.

Appellants therefore respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's decision rejecting claims 1-2 and direct the Examiner to pass the case to issue.

The Commissioner is hereby authorized to charge the appeal brief fee of $300.00 and any additional fees which may be necessary for consideration of this paper to Kenyon & Kenyon Deposit Account No. 11-0600. A copy of this sheet is enclosed for that purpose.

Respectfully submitted,

Date: June 27, 2001

Julie E. Stein (Reg. # 43,158)

KENYON & KENYON
1500 K Street, N.W.
Washington, D.C. 20005
(202) 220-4222 (telephone)
(202) 220-4201 (facsimile)

APPENDIX

(Brief of Appellants KATSUBE et al.
U.S. Patent Application Serial No. 09/066,168)

CLAIMS ON APPEAL

1. A permselective membrane module comprising i) two permselective membrane elements formed of hollow fibers arranged substantially in parallel and bundled together and ii) a container, the two elements being arranged in the container longitudinally of the hollow fibers,

wherein the respective elements comprise i) a feed tube disposed longitudinally of the hollow fibers and ii) a hollow fiber bundle covering the outer surface of the feed tube, the feed tube having a number of holes therein, and the hollow fibers having one end closed and the other end opened,

wherein the feed tubes of the two elements communicate with each other via a connecting tube to form a conduit having one end opened and the other end closed,

wherein the container comprises i) an inner wall surrounding the two elements with a space, ii) a feed port provided at one end of the container in communication with the opened end of the conduit, iii) a permeate-liquid outlet facing the open end of the hollow fiber bundle of each element and extending through the container wall, and iv) a non-permeated fluid discharge outlet located as opposed to the outer surface of each element and extending through the container wall in communication with a gap and the outside of the container wall, and

further wherein the container comprises a cylindrical pressure vessel, the centerline of the discharge outlet being substantially proximal to one end of the cylindrical pressure vessel

whereby any space downstream of said outlet is sufficiently small to allow purging of suspended materials, thereby minimizing pressure loss in the permselective membrane module.

2. A permselective membrane module comprising i) two permselective membrane elements formed of hollow fibers arranged substantially in parallel and bundled together and ii) a container, the two elements being arranged in the container longitudinally of the hollow fibers,

wherein the respective elements comprise i) a feed tube disposed longitudinally of the hollow fibers and ii) a hollow fiber bundle covering the outer surface of the feed tube, the feed tube having a number of holes therein, and the hollow fibers having one end closed and the other end opened,

wherein the feed tubes of the two elements have one end opened and the other end closed,

wherein the container comprises i) an inner wall surrounding the two elements with a space, ii) a feed port provided at one end of the container in communication with the opened end of the feed tube of one of the elements, iii) an inner liquid receiving plate located between the two elements to collect the liquid not permeated through said one elements, iv) a connecting tube for connecting the inner liquid receiving plate with the open end of the feed tube of the other element, v) a permeate-liquid outlet facing the open end of the hollow fibers of each element and extending through the container wall, and vi) a non-permeated fluid discharge outlet located as opposed to the outer surface of the other element and extending through the container wall in communication with the space and the outside of the container wall, and

further wherein the container comprises a cylindrical pressure vessel, the centerline of the discharge outlet being substantially proximal to one end of the cylindrical pressure vessel

whereby any space downstream of said outlet is sufficiently small to allow purging of suspended materials, thereby minimizing pressure loss in the permselective membrane module.